REMARKS

Claim 15 has been rejected under 35 U.S.C. §102(e) as anticipated by Gonjo et al, while Claims 16-36 have been rejected under 35 U.S.C. §103(a) as unpatentable over Gonjo et al. In addition, Claims 15-32 have been rejected on grounds of obviousness-type double patenting over Claims 1 through 10 of U.S. Patent No. 6,830,736. However, for the reasons discussed hereinbelow, Applicants respectfully submit that all claims of record in this application distinguish over the cited references, whether considered separately or in combination.

The present invention is directed to a device for generating hydrogen rich gas from a hydrogen containing fuel by means of a reforming reaction. Such gas generating devices are used, for example, to supply hydrogen to a fuel cell for the purpose of generating electricity. For this purpose, such a gas generator typically includes feed lines for supplying starting materials, discharge lines for discharging the reformate gas (principally hydrogen), at least one component for evaporating liquid starting materials, one or more components for performing the reforming reaction, at least one component for the catalytic generation of thermal energy, and at least one component for reducing the carbon monoxide level in the reformate.

According to the present invention, a particularly compact and efficient hydrogen generating device as provided by forming at least two of the components referred to above in a single porous catalytic plate which comprises a porous layer of catalyst material through which the reaction starting materials can flow. As shown in Figure 1, for example, the single porous catalyst plate has openings 31 at one extremity, by which the starting materials (water or water vapor and air) can enter the catalyst plate 2 and travel along a flow path within the porous plate, from left to right in the drawing of Figure 1. Formed sequentially within the catalyst plate are a plurality of mixing regions by which fuel may enter via openings 41 and additional air may be supplied via openings 43 and 45. The mixing regions are arranged sequentially with an evaporation region 5, a reforming region 6 and an oxidation region 7, all within the individual porous plate 2. Discharge passages 71 are provided at the opposite extremity of the plate, for guiding an output flow of reforming gas. The evaporation region and reforming region are heated by respective heating passages 51 and 61, which are sealed from the material in the porous catalyst plate, so that there is no exchange of fluid between the heating passages and the porous catalyst plate 2.

As noted previously, the integration of a plurality or, if appropriate, all of the components mentioned previously in a single common porous plate makes it possible to achieve a further improvement in terms of the mass and volume of

the gas generator unit, leading to the efficiencies and advantages mentioned previously.

The latter features are recited in each of independent Claims 15, 29 and 33 of the present application. In particular, Claim 15 recites that at least two of the "components" (that is, the evaporating component, the reforming component, the catalytic heater, and the carbon monoxide reducing component) are "formed as integral portions of a common plate" which plate at least partially comprises a porous layer of pressed catalyst material through which the reaction starting materials can flow. Claim 29, on the other hand, also recites that at least two of the components are formed as integral portions "of a single porous catalyst plate that comprises a substantially planar and continuous elongate layer of pressed catalyst material". In addition, Claim 29 further recites that the components are arranged along a flow path that is contained within the layer of catalyst material and is oriented in a direction parallel to a longitudinal axis thereof. Claim 33 is similarly limited. The latter features of the invention are neither taught nor suggested by the cited references.

In particular, the Gonjo et al reference discloses a fuel reforming apparatus comprising a stack of plates, each of which forms a different component. The latter components include a liquid feed heating portion, an evaporation portion, a steam super heating portion, a reforming portion, a shift

reaction portion, a CO oxidation portion, a catalytic combustion portion and a heat recovery portion.

Several embodiments of the fuel reforming apparatus according to Gonjo et al are disclosed, all of which share the same essential features which are pertinent to the claims of the present application. That is, as noted previously, each of the "portions" referred to above is constituted by a separate plate within the stack of plates which collectively constitute the reforming apparatus. Thus, for example, Gonjo et al notes at Column 6, lines 9-19 that

> "The elements are formed into flat plate elements made of a light alloy, and the flat plate elements have a manifold for performing intake and exhaust with respect to surroundings and also have heat-transfer fins in the interior. The elements are integrally stacked in close proximity to one another from a high temperature side to a low temperature side in order of the catalytic combustion portion, reforming portion, steam super heating portion, heat recovery portion, shift reaction portion, evaporation portion, CO oxidation portion and liquid feed heating portion."

The first embodiment of the Gonjo et al apparatus, illustrated in Figure 1A, is representative of this structure. In particular, it shows separate layers comprising a liquid feed heating portion 1, CO oxidation portion 5, heat recovery portion 7a, evaporation portion 2, shift portion 4a, heat recovery portion 7b,

steam super heating portion 3, catalytic combustion portion (upper) 6a, reforming portion 4 and catalytic combustion portion (lower) 6b.

The structure "of the flat plate elements of the fuel reforming apparatus" is illustrated in Figures 4 through 8, and discussed in the specification at Column 13, line 30 through Column 17, line 39. In particular, the separate plates 4 and 5 which respectively form the liquid feed heating portion and the CO oxidation portion of Figure 1 are illustrated in Figure 4, while the respective plates 24 and 29 which collectively form the evaporation portion 2 are shown in Figure 5. As discussed in the specification at Column 14, lines 50 *et seq.*, "The evaporation portion 2 is constituted by stacking a liquid feed dropping plate 24 and an evaporation plate 29." (Column 14, lines 52-54.) The "multiple layer reforming portion 4 and the catalytic combustion portions 6a and 6b of the fuel reforming apparatus" (Column 15, lines 28-29), are illustrated in Figures 6, 7, 8a and 8b.

As can be seen from the foregoing brief description, Gonjo et al neither teaches nor suggests a hydrogen generating apparatus in which a plurality of the components which collectively constitute the apparatus are formed as integral portions of a common plate made of a porous layer of pressed catalyst material, as recited in Claim 15. Moreover, Gonjo et al also fails to disclose such an arrangement in which the components are formed as integral portions of a single

catalyst plate that comprises a substantially planar and continuous elongate layer of pressed catalyst material, with the at least two components being arranged along a flow path that is contained within the layer and oriented in the direction parallel to a longitudinal axis of the layer, as recited in Claims 29 and 33. Accordingly, Applicants respectfully submit that independent Claims 15, 29 and 33 distinguish over Gonjo et al. For the sake of completeness of the record, Applicants note that both the present application and the Lamla et al patent (U.S. Patent No. 6,830,736) are currently owned by NuCellSys GmbH, a German company.

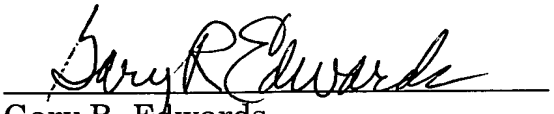
Claims 16-32 have been rejected on grounds of obviousness-type double patenting over Claims 1 through 10 of the '736 patent. However, Applicants respectfully submit that the claims of the present application distinguish over Claims 1 through 10 of the '736 patent for the same reasons discussed above with respect to Gonjo et al. That is, none of Claims 1 through 10 defines any structure which has the features described above, and recited in Claims 15, 29 and 33. Rather, Claim 1, the only independent claim, defines a catalytic reactor having a multi-layer structure comprising alternating first and second porous catalyst layers. Nothing contained in any of the claims suggests that multiple components of the device are formed in a single common layer. Moreover, a review of the specification confirms that indeed the respective layers are

separate, as recited in the claims. Accordingly, Applicants respectfully submit that all claims of the present application distinguish over the '736 patent as well.

In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #1748BA/50992).

Respectfully submitted,



Gary R. Edwards
Registration No. 31,824

CROWELL & MORING LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844
GRE:kms
2670742v1